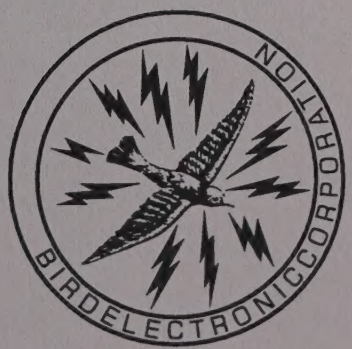
OPERATING INSTRUCTIONS

BLOWER ASSEMBLY
MODEL BA-300/310



INSTRUCTION BOOK

BLOWER ASSEMBLY
MODEL BA-300/310

Electronic Corporation
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MODELS COVERED IN THIS INSTRUCTION BOOK

BA-300-115	BA-310-115
BA-300-230	BA-310-230

SAFETY PRECAUTIONS

The following are general safety precautions that are not necessarily related to any specific part or procedure and do not necessarily appear elsewhere in this publication. These precautions must be thoroughly understood and apply to all phases of operation and maintenance.

KEEP AWAY FROM LIVE CIRCUITS

Operating personnel must at all times observe normal safety regulations. Do not attempt to replace parts or disconnect an RF transmission or any other high voltage line while power is aplied. When working with high voltage always have someone present who is capable of rendering aid if necessary. Personnel working with or near high voltage should be familiar with modern methods of resuscitation.

DO NOT SERVICE OR ADJUST ALONE

Under no circumstances should any person reach into an enclosure for the purpose of service or adjustment of equipment except in the presence of someone who is capable of rendering aid.

SAFETY EARTH GROUND

An uninterruptible earth safety ground must be supplied from the main power source to test instruments. Grounding one conductor of a two conductor power cable is not sufficient protection. Serious injury or death can occur if this grounding is not properly supplied.

SHOCK HAZARD

Do not attempt to remove RF transmission line while power is present.

CHEMICAL HAZARD

Dry cleaning solvents use to clean parts may be potentially dangerous. Avoid inhalation of fumes and also prolonged contact with skin.

RESUSCITATION

Personnel working with or near high voltages should be familiar with modern methods of resuscitation.

SAFETY SYMBOLS

WARNING

Warning: Warning notes call attention to a procedure which, if not correctly performed, could result in personal injury.

CAUTION

Caution: Caution notes call attention to a procedure which, if not correctly performed, could result in damage to the instrument.

The following warnings appear in text where there is procedures, that if not carefully followed, could be detrimental to operating and maintenance personnel and are repeated there for emphasis.

FOR BA-300/310 BLOWER ASSEMBLY

WARNING

Never attempt to disconnect the equipment from the transmission line while RF power is being applied. Leaking RF energy is a potential health hazard.

The following cautions appear in the text whenever a procedure, if not properly followed, could put the equipment in danger of damage and are repeated here for emphasis.

CAUTION

Although the Model BA-300/310 Blower Assembly, when installed and running, will double the original power rating of a load, it will also derate a load by 50 percent when installed and not running. If the power ON indicator light should go off and/or the blower stop, the RF power should be immediately turned off or else reduced by at least 75 percent (i.e., to half the original power rating of the load).

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SECTION I. INTRODUCTION

1.1. PURPOSE AND FUNCTION

These units are provided to supply forced air cooling to certain Bird Electronic RF power termination equipment that use the rhombic type radiator shell. Such models include TERMALINE® Load Resistors in the 8890-300 Series and the intermediate power TENULINE® Attenuators Series 8329-300. These units may be attached at will to the BA-300 Blower Assembly. Attachment of various units to the BA-310 blower unit will provide automatic operation suitable for reject load service.

1.2 PERFORMANCE CHARACTERISTICS AND CAPABILITIES

The BA-300/310 consists of two high efficiency fans, equipped with power cord and operating controls mounted in a special base. It is fitted with vertical side baffles which direct the air through the radiator fins. The fans are protected on the bottom and sides by a perforated housing which permits air to enter freely. The controls consist of a line switch, fuse, and a panel light, which indicates "power on". The blower approximately doubles the normal RF input rating of the installed load resistor; i.e., 2-1/2 kW is raised to 5 kW for continuous duty.

The Model BA-310 is, however, equipped with a thermoswitch connecting cable (P/N 8931-114) wired across the ON/OFF switch. When a Series 8890-310 load is properly installed on the blower unit and the fan control thermoswitch is connected, the blower will operate automatically with rise of coolant temperature. The fan control thermoswitch (P/N 4250-085) is installed in the uppermost hole provided on the front face of the unit. When RF power is applied to the load and the internal temperature reaches a preset level, the blower will automatically come on to cool the load. In the manual position of the "MANUAL/AUTOMATIC" switch, the blower will operate independent of the thermoswitch.

The "BLOWER ON" pilot lamp on the Model BA-310 will be on at all times to indicate that ac line power is present for operation, which differs from the Model BA-300 unit. With the Model BA-300 the "BLOWER ON" indicator lights only when the "ON/OFF" switch is in the "ON" position.

1.3. DIMENSIONS AND WEIGHT

The BA-300/310 is 17 5/32 inches high, 7 3/8 inches wide and 21 5/8 inches long (435.8 x 187.3 x 549 mm). When installed on a Series 8890-300 Load Resistor or an 8329-300 Attenuator the overall height becomes 22 1/16" (560 mm). The net weight of the BA-300 alone is 13 1/2 lb (6 kg) and the shipping weight is 20 lb (9 kg).

1.4. POWER AND UTILITY REQUIREMENTS

The Model BA-300 or BA-310 must be ordered for operation on either 115 Vac, 50/60 Hz or 230 Vac, 50/60 Hz (400 Hz versions are available on special order). Adding the suffix numbers -115 or -230 to the model number indicates the choice. The 115 V type draws 0.6 amps maximum and the 230 V type 0.3 amps maximum. The blower motors are protected by a 1/2 amp fuse.

1.5. ENVIRONMENTAL REQUIREMENTS

The BA-300/310 Blower Assembly should be used in a dust and vibration free environment. The blower assembly is ruggedly built; however, a collection of dust or dirt on the propeller will impair the efficiency. The blower will function according to its specifications and the load will perform to specifications if the ambient temperature remains within the -40° to +45°C (-40°F to +113°F) range and their access to air is not impeded. Unobstructed space must be provided around the BA-300/310 blower for proper ventilation.

1.6. ITEMS FURNISHED

The BA-300/310 is equipped with a 3AG-1/2 amp fuse installed and a detachable 3-wire power cable. The 230 Vac power cable is furnished without a connector to the power line so that the user can wire in his own choice of male plug. When ordered with a Series 8890-300 Load Resistor or a Model 8329-300 Attenuator, the blower assembly is shipped already mounted in place. It is strongly recommended that a load or attenuator, when equipped with the BA-300, be also equipped with an interlock thermoswitch as a safety measure. The side baffles of the blower assembly obstruct the flow of the normal natural air convection currents and as a result reduce the original load power

dissipation capacity by 50 percent if the blowers are, for any reason, not functioning. This instruction book is the only additional part furnished with the BA-300 or BA-310 Blower Assemblies.

1.7. ITEMS REQUIRED

No additional equipment is required for the Model BA-300 except in the case of the 230 Vac type, for which the user must furnish his own mating plug, for the power line, to be installed on the power cable. Of course, an appropriate ac socket must be located convenient to the equipment. The Model BA-310 requires a compatible Series 8890-310 radiator with two thermoswitch openings. A control thermoswitch (P/N 2450-085) is also required for automatic operation.

1.8. TOOLS AND TEST EQUIPMENT

Only simple tools such as screwdrivers are needed for dismantling the blower assembly. A soldering iron will be needed for replacing electrical components. A simple volt-ohm meter will suffice for checking the electrical circuitry and the thermoswitch. A set of box wrenches or adjustable wrenches will be necessary for load installation or changing thermoswitches.

1.9. UNIT SPECIFICATIONS

BA-300/310 BLOWER ASSEMBLY

AC Power Requirements	
115 Vac	0.6 amps at 50/60 Hz
230 Vac	0.3 amps at 50/60 Hz (400 Hz units, special)
Dimensions	21 5/8"L x 7 3/8"W x 17 5/32"H assembled (549.3 x 187.3 x 435.8 mm)
Weight	13.5 lb (6.1 kg)
Color	Light navy gray baked enamel (MIL-E-15090)

SECTION II. INSTALLATION

2.1. MOUNTING

The blower assembly base is installed in essentially the same manner on both the Series 8890-300 Loads and the Model 8329-300 Attenuator. The base mounting dimensions are the same as those of the contained radiator; namely four 3/8 inch x 15/32 inch slotted holes on a 20 23/32 inch x 4 1/2 inch (526 x 114.3 mm) rectangle. The BA-300 and BA-310 Blower Assemblies, therefore, fasten directly to fittings previously used for Series 8890-300 Radiators, etc. Note that installing the blower raises the overall height by 4 7/8 inches (124 mm).

2.2. AIR CIRCULATION

Free air access must be provided above and around, and especially the sides of the BA-300/310 when used on a table. Three inches (7.6 cm) should suffice. The blower may also be mounted so that it is entirely open below. Side clearance in this case will not be as essential.

2.3. RETROFITTING

Installation: When installing the Model BA-310, go to paragraph 1-7 thermoswitch installation before proceeding with this paragraph. Where the BA-300 is to be added as a new accessory to existing equipment, proceed as follows:

a. Detach the load resistor from its existing installation.

b. Untie the hardware bag from the new blower unit and take out the four 10-32 x 3/8 inch truss head screws (Item 14) and the four sets of 5/16 - 18 x 1/2 inch fastening (Item 15) for the radiator base.

c. Using a phillips head screwdriver, take off one of the vertical side panels, either right or left, by removing the two 10-32 x 3/8 inch truss head screws.

d. Place the load or attenuator on the BA-300/310 Blower Assembly and against the remaining vertical side panel. Care must be taken to place the units facing front over front; i.e., load input connector facing the same direction as the control panel of the blower.

e. Line up the base holes and fasten the load and blower together loosely with nuts and screws (Item 15) provided in the accessory bag.

f. Remount the side panel removed in Step c; loosely replace the truss head screws previously removed.

g. Line up the holes, located on the tabs of the side panels, with those provided on the front and rear faces of the load. Secure with the four 10-32 x 3/8 inch truss head screws (Item 14) provided in the accessory bag. Note - It may be necessary to temporarily loosen the two screws in the unremoved vertical panel to facilitate this.

h. Tighten all the screws and base mounting fastenings securely.

i. Observing polarities, attach the female plug of the power cord to the socket at the rear of the blower. Push the plug into the receptacle until bottomed, and then twist clockwise slightly to lock it in place.

2.4. THERMOSWITCH INSTALLATION

A control thermoswitch is required for automatic operation of the Model BA-310. This thermoswitch is a normally open type and its contacts close on temperature rise of 155°C (311°F). The fans will then turn on to force cool the load. This thermoswitch (P/N 2450-085) should be ordered with the BA-310 blower assembly.

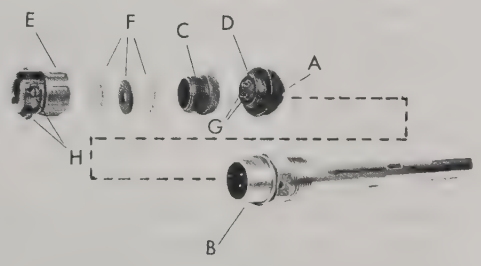


Figure 2-1. Thermoswitch Assembly

If a thermoswitch is to be field installed, proceed as follows:

a. Replace the vent plug in the load with the shipping plug first. Then stand the load on its back end with the connector end up. In this position there is no danger of the coolant pouring out through the socket plug hole.

b. Using a 9/16 inch allen wrench, remove the socket plug that lies just above the connector assembly and interlock thermoswitch.

c. Replace the plug with the control thermoswitch. Use an acceptable pipe sealing compound sparingly on the external threads only of the thermoswitch. Do not contaminate the coolant with pipe sealing compound. Observe closely for coolant leaks upon completion.

Connect the thermoswitch as follows: (See reference photo figure 1-1).

a. Unscrew the larger knurled ring-nut (A) at the lower end of the coupling jack assembly. Pull it off from the thermoswitch jack (B). Unscrew the small knurled cover fitting (C) from the base plug (D) of the connector to release the base.

b. Thread the control switch wires through the clamp (E) with the washers (F) inside and with its treaded fitting in place. Service the control switch wire with short tips, use spaghetti sleeves over the wire ends if needed. Then securely solder the control switch leads to the lugs (G) of the connector base. Note: Be sure that the larger captive clamping nut (A) is in place over the base plug (D) with the knurled end outward towards face.

c. Screw on the cover ring (C) first, then fasten the cable clamp (E) in place, and tighten the two yoke screws (H) on the cable. Push the plug back on to the thermoswitch, and tighten the captive knurled connecting ring. Do not attempt to operate the equipment without the interlock attached.

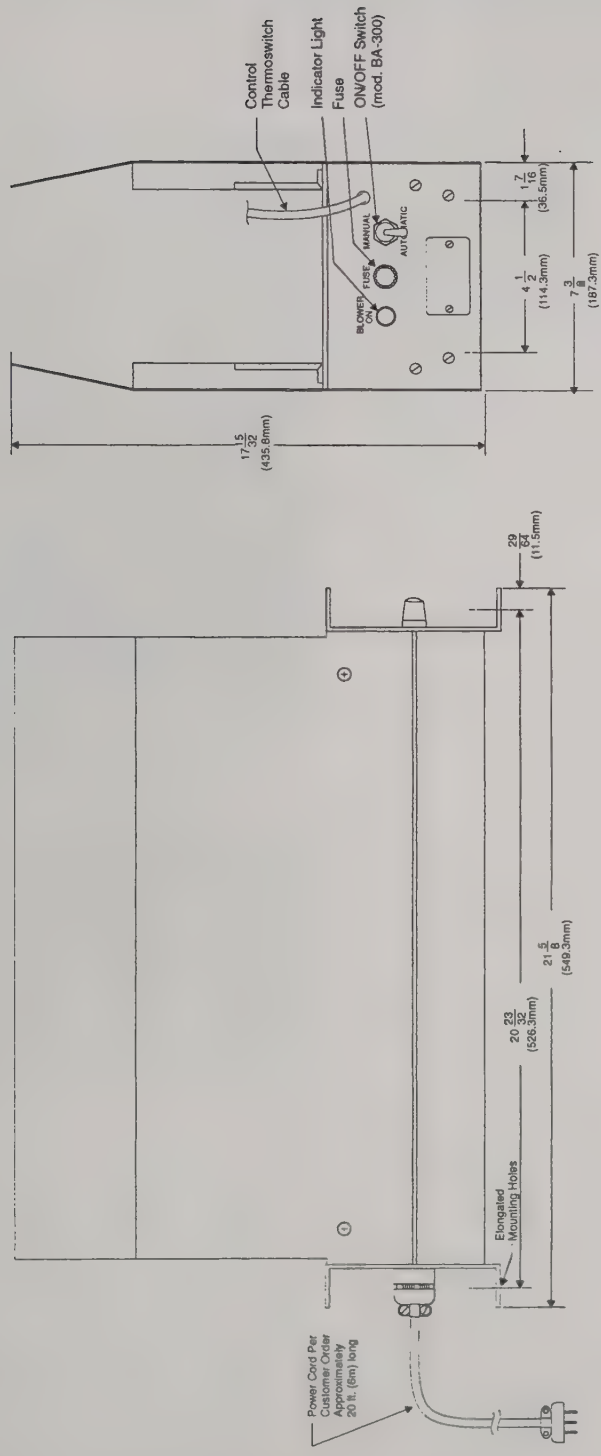


Figure 2-2. General Outline Model BA-310

SECTION III. THEORY OF OPERATION

3.1. GENERAL

The Series 8890-300 TERMALINE® Load Resistor and the Series 8329-300 TENULINE® Attenuator convert RF energy into heat. The heat must be transferred quickly to the surrounding environment in order to prevent damage to the thin film resistor. The dielectric coolant fluid that bathes the resistor transports the heat by convection currents to the walls of the radiator chamber. There, normal convection currents of air passing over the radiator fins that encase the chamber carry away the heat. When the load or attenuator is mounted on the BA-300 Blower Assembly, side baffle plates cover most of the radiator fins so that the high volume of air flow generated by the twin fans is confined to passing over the fins. This forced draft air flow so increases the heat transfer efficiency of the fins that up to twice as much RF energy can be dissipated than normal convection air currents would permit. Thus the maximum RF power dissipation rating of the load is doubled from 2.5 kW to 5 kW, for the attenuator 2 kW to 4 kW.

3.2. POWER RATING REDUCTION

It should be noted that the side baffles that direct the air flow from the fans over the radiator fins, interfere with the free flow of normal convection air currents over the fins. This results in a substantial reduction in the heat transfer efficiency of the fins if the forced draft is cut off. The reduction is in the order of 50 percent which therefore reduces the maximum power dissipation rating of the load from 2.5 kW to 1.25 kW, for the attenuator 2 kW to 1 kW.

SECTION IV. OPERATING INSTRUCTIONS

4.1. USE AND FUNCTION OF CONTROLS

The only operating control on the Model BA-300 Blower Assembly is the ON/OFF switch for applying power to the fans. This switch is labeled manual/automatic on the Model BA-310. When power is applied an indicator lamp lights up.

4.2. INITIAL ADJUSTMENTS

No adjustments are required.

4.3. START-UP

The only start-up procedure is to turn on the fan switch. This is not necessary on the Model BA-310 since operation is automatic. The manual/automatic switch should be switched to the manual position momentarily, however, to assure blower operation.

4.4. NORMAL OPERATION

CAUTION

Although the Model BA-300/310 Blower Assembly, when installed and running, will double the original power rating of a load, it will also derate a load by 50 percent when installed and not running. If the power ON indicator light should go off and/or the blower stop, the RF power should be immediately turned off or else reduced by at least 75 percent (i.e., to half the original power rating of the load).

When a Model BA-300 blower is used in conjunction with a load, always start the blowers first before applying RF power to the load resistor. Turn the line switch on. The power ON indicator should light up indicating that the fans are running; check for air flow above the radiator. Keep the blowers going throughout the operation of the load resistor. When the Model BA-310 blower is installed the "POWER ON" indicator lamp will be on at all times when ac line power is applied. The fans will run only in the manual position when there is no RF power applied.

4.5. OPERATION UNDER ABNORMAL CONDITIONS

Should the power ON light go off and the blowers stop, the load power should be immediately turned off, or reduced to approximately half of the load's original power rating. Investigate the cause in either case and correct, see Section V - Maintenance. The load or attenuator can be subjected to moderately higher power levels for short intervals. Sufficient time should be allowed between intervals for adequate cooling. If such overloading is to become a normal practice, then it is strongly recommended that an interlock thermoswitch be installed for protection against overheating.

4.6. SHUTDOWN

Always turn off the source of RF power before turning off the blower unit. It is generally good practice to wait a few minutes for the resistors to cool before turning off the blower unit. When the unit has been in operation for some time, absorbing RF power greater than 1000 watts, allow the blower unit to run for approximately 15 minutes after the RF power has been turned off. This will allow the resistors and RF input connector assembly to cool to a safe and convenient temperature. The BA-310 assembly will automatically continue to run until the load coolant has reached safe temperature.

4.7. EMERGENCY SHUTDOWN

WARNING

Never attempt to disconnect the equipment from the transmission line while RF power is being applied. Leaking RF energy is a potential health hazard.

In an emergency situation, always cut off the RF power source first. In the case of emergencies caused by a failure of the blower function, the thermoswitch, P/N 8890-008 (P/N 8329-028 for the Model 8329-300 Attenuator) will turn off power to the RF source when the temperature of the coolant reaches an unsafe high level. Equipping the load or attenuator with a thermoswitch is especially recommended when the blower assembly is added to increase the power dissipation capacity.

SECTION V. MAINTENANCE

5.1. TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	REMEDY
No air flow from blowers; power ON indicator not lit	Fuse burnout	Replace 3AG-1/2 amp fuse after checking and correcting cause of burnout.
	Unplugged power cable	Reattach.
	Line power failure	Check for cause.
No air flow from blowers; power ON indicator lit	Fan obstruction by bent grill	Straighten out protective grill.
	Fan motors over-heated	A thermal protection circuit automatically shuts off the motors temporarily. Check for clogging of the grill or fan blades by accumulated grime.
	Fan motors burnt out	Replace fan motors (see parts list).
Air flow from blowers; power ON indicator not lit	Burnt out lamp	Replace (see parts list).

5.2. CLEANING

This equipment requires only normal maintenance care. Avoid accumulation of dust and lint particularly on the intake grills, the fan, or on the inside surface of the baffles. Keep the unit dusted off overall. Wiping thoroughly with a clean soft cloth will do. Store under protected conditions when not in use. If the BA-300/310 Blower has been standing without an installed load unit, check for objects that may have entered blower openings.

5.3. INSPECTION

Inspect the blower assembly regularly for the accumulation of grime particularly in locations that might impede the free flow of air, i.e., intake grill and fan blades. If the BA-300/310 is attached to a load or attenuator, check and clean the radiator cooling fins under the baffles regularly. A heavy coating of dust will interfere with the efficient transfer of heat from the fins to the air flow.

5.4. PREVENTIVE MAINTENANCE

No preventive maintenance is required other than regular cleaning as outlined above in paragraph 5.2 and 5.3. The fan motors have sealed-in lubricated bearings thus no lubrication is necessary.

5.5. DISASSEMBLY

To gain access to the wiring and components of the power equipment, remove the four 8-32 pan head

screws from each face, front and back, of the base frame. These screws are placed diagonally across the face corners, and upon removal, the perforated guard may be pulled straight off the bottom.

5.6. REASSEMBLY

To reassemble, replace the fan guard and adjust it to align the screw holes. Replace the 8-32 screws.

5.7. REPAIRS

In the event of possible fuse burnout, check and correct the cause before replacing the fuse. Look for stuck or blocked fan rotors, or possibly a short circuit in the motor or in the blower wiring. To remove the fuse, press the knob in firmly, turn counterclockwise to stop, and then pull the fuse holder out. Reverse the procedure to replace.

The power ON indicator light should not normally need replacing. However, if failure should occur, the entire unit must be replaced. For this replacement the perforated guard must be removed (see paragraph 5.5, Disassembly). Unsolder the wires from the lugs on the indicator light and unscrew the retaining nut to remove the entire unit. Reverse the procedure to reinstall the light.

The individual blowers are held in place by four 8-32 x 3/8 inch stainless steel pan head machine screws and connected to the electrical circuitry by solder terminals. To replace a fan assembly:

a. First remove the grill as in paragraph 5.5, Disassembly.

b. Carefully unsolder the color coded connecting wires and note their proper location for resoldering.

c. Loosen and remove the four mounting screws being careful not to lose the lipped retaining washers.

d. Remove the defective fan.

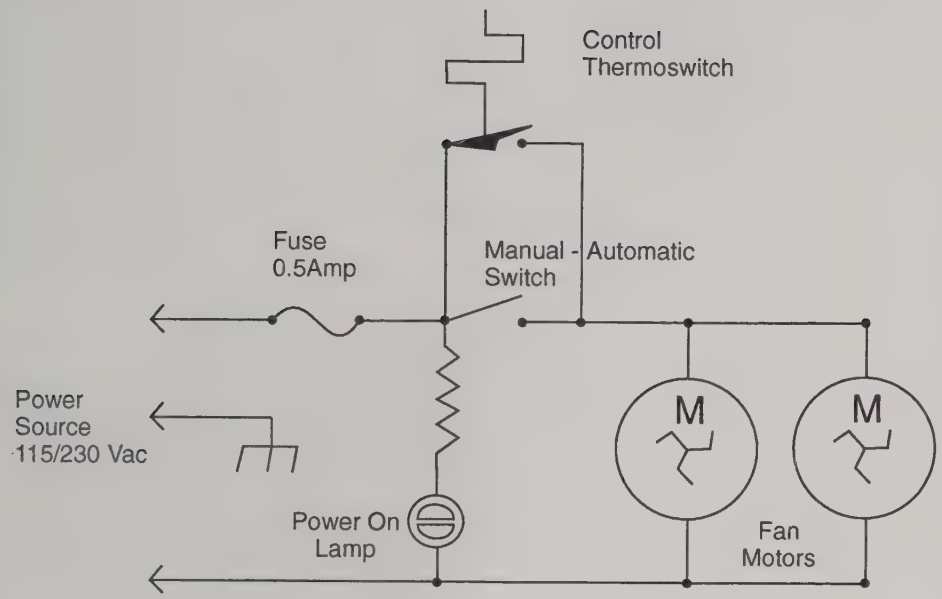
e. Insert the replacement fan, taking care to install it right side up, with the fan blade assembly facing down toward the grill.

f. Insert the mounting screws with retaining washers into the mounting holes. Turn the retaining washers so that the lipped portion fits over the rim of the fan frame. Tighten the screws in place. If the fan unit replaced is the one closest to the socket for the power cable, do not neglect to reattach the green ground wire to the closest mounting screw.

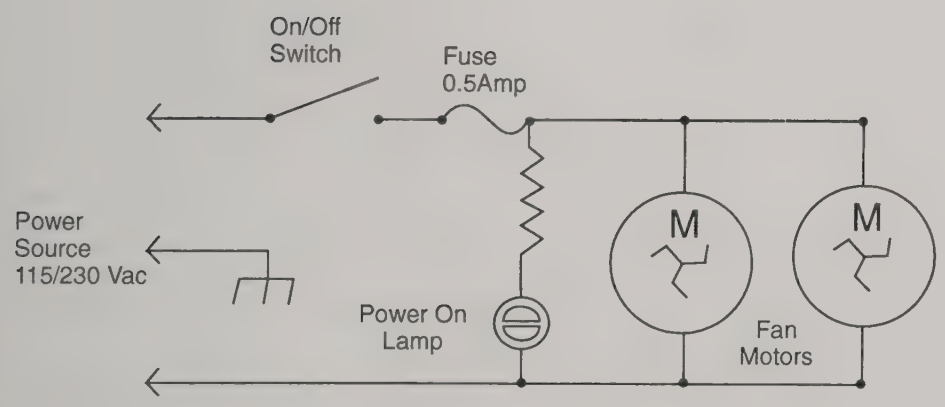
g. Solder the two connecting wires to the solder lugs on the motor unit in accordance with the proper color coding.

h. Replace the grill onto the bottom of the frame (see paragraph 5.6, Reassembly).

i. Before reattaching the blower assembly to the load or attenuator, check the fans for free and unimpeded movement of the blades.



Model BA-310



Model BA-300

Figure 5-1. Schematic Diagrams

SECTION VI. PREPARATION FOR RESHIPMENT

6.1. GENERAL

No special preparation is required for packing a Model BA-300/310 Blower Assembly for shipment whether it is attached to a load or attenuator or not. The power cable should be detached, looped, wrapped and then taped to the housing for safe keeping. If the blower assembly is by itself, it can be safely shipped in a sturdy corrugated paper shipping carton. If it is attached to a load or attenuator, then a wood crate is recommended because of size and weight.

SECTION VII. STORAGE

7.1. GENERAL

No special preparation is required for storing a Model BA-300/310 Blower Assembly. It is best to cover the assembly to prevent the accumulation of dust on the grill and fans and that the storage environment be as clean, dry, and dust-free as possible. The ambient temperature should preferably be kept within the working range of -40°C to +45°C (-40°F to +113°F).

SECTION VIII. REPLACEMENT PARTS LIST

8.1. GENERAL

ITEM	QUANTITY	DESCRIPTION	PART NUMBER
1	1	Power switch	5-1069
2	1	Fuse holder	5-547
3	1	Indicator light	5-860
4	1	Dropping resistor -230 V model	5-097-8
5	1 1	Wire -115 V model BA-300 Wire -115 V model BA-310	8950-026-7 8950-026-16
6	2 or	Feather fan -115 V model	5-383
7	2	Feather fan -230 V model	5-381
8	1	Base guard assembly	8950-306-1
9	1 or	Power cable -115 V model standard	8950-023-1
10	1	Power cable - 230 V model	8950-023-2
11	1	Fuse 3AG-1/2A - 115 V and -230 V	5-721-2
12	8	Fan clamp	8950-010
13	8	Fan clamp screws (8-32 x 3/8" pan head machine screws, stainless steel)*	Standard 1118-0600-00
14	4	Side panel screws (10-32 x 3/8" phillips truss head machine screws, stainless steel)	Standard 1120-0619-00
15	4	Radiator base mounting (5/16-18 x 1/2" hex head cap screws & nuts, stainless steel)**	Standard 1122-0807-00

*Use with No. 8 internal tooth lockwashers, p/n 1132-0305-00
**Four each of these are provided in accessory bag.

QUALITY INSTRUMENTS FOR RF POWER MEASUREMENTS

From 2 to 2300 MHz and from 25 milliwatts to 250 kilowatts in 50 ohm coaxial line systems

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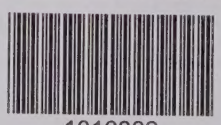

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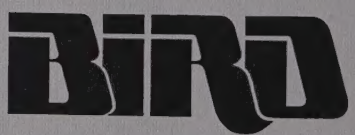

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